How to Read Historical Mathematics

By Benjamin Wardhaugh. Princeton and Oxford (Princeton University Press). 2010. ISBN 978-0-691-14014-8. 113 pp. US$23.95.

Historians of European politics, medieval religion, or Latin American politics take for granted that their students will learn to use primary sources. Those who teach the history of mathematics to undergraduates, at least in the United States, tend to rely less on primary sources or to focus on the mathematics in the sources and not on questions about the sources themselves. This emphasis is natural for mathematicians, the usual instructors of undergraduate courses on the history of mathematics, who have usually had little or no training in the use of primary sources.

Benjamin Wardhaugh's short guide, *How to Read Historical Mathematics*, will introduce these instructors and their students—indeed, anyone new to the history of mathematics as a discipline—to the problems, puzzles, and rewards of understanding the past by reading the texts of the past. It will begin to equip them with the skills needed to read primary sources historically.

The book is organized in short chapters, each of which explains and illustrates a particular aspect of studying a text. The preface, in addition to giving an outline of subsequent chapters, provides a brief but compelling apology for the study of the history of mathematics. Wardhaugh points out that "reading the mathematical 'classics' is a way to enrich ourselves, to engage with our predecessors and learn from them" (viii). It gives us "access to the great minds of the past" (viii), and teaches us something about ourselves while "bringing to life some of the human stories which make up what is fundamentally a very human enterprise" (ix).

As readers make their way through this book, they learn by doing. Wardhaugh begins each chapter with an excerpt (or in one case, a photograph) of a text and asks the reader to ponder a set of questions. Every few pages, he poses a question for students to pause and think about before continuing, and he summarizes his main points in boxes set off from the rest of the text. Each chapter ends with a series of open-ended questions about additional texts that give the reader another opportunity to apply the skills acquired in the chapter.

Chapter 1 focuses on understanding the content of a text and opens with Tartaglia's algorithm for solving a cubic, using the rhetorical translation found in Fauvel and Gray [1987]. Setting that version alongside a modern algebraic rendition, he guides the reader through the text, step-by-step, showing how one might decipher the former. The exercise is repeated with a short lemma from Newton's *Principia*. Beyond helping readers translate sixteenth- and seventeenth-century words into modern notation, Wardhaugh suggests ways to think carefully about what is lost or changed by the modernization.

Galois's final letter to Chevalier confronts readers at the start of chapter 2. Without giving them any context or even Galois's name, Wardhaugh asks readers what they can learn about the author and about the time and place in which the letter was written. He suggests some questions: "For example, is this a member of the mathematical establishment, or an outsider? Is he young, or old? Does he get on well with other mathematicians or not?" (23) After a lesson in closely reading the text for clues, Wardhaugh provides a brief introduction to the world of secondary and tertiary sources, mentioning some specific resources, both print and electronic. Finally, he raises questions about the broader historical context—social, political, intellectual, mathematical—in which the author worked.

Chapter 3 deals with texts as "real physical objects," (51), and through the analysis of some photographs explores what can be learned from the object itself. Wardhaugh considers such questions as a book's size—can it be carried around in one's pocket or would it belong in a library? Was it an expensive or a mass-produced book? Are there any signs of its owner(s) on the text? Pointing out that we sometimes must rely on transcriptions of original versions of texts—what Wardhaugh calls "disembodied texts"—he helps the reader think about the problems one confronts in creating these transcriptions.

In the spirit of chapter 2, Wardhaugh begins chapter 4 with a long excerpt and a guided close reading that considers the audience, rather than the author of the text. Here, the text is an excerpt of L'Hôpital's *Analyse des infiniment Petits* from Struik [1969]. The analysis of a textbook allows Wardhaugh to discuss genre and explore issues relating to published versus unpublished texts, or public versus private mathematics.

In the final chapter, Wardhaugh provides one last set of questions to equip the reader as an historian, these somewhat more general than questions in the earlier chapters: How has a particular mathematical idea changed? Is it significant? Why are you reading it? At the outset, an excerpt from Lagrange's 1771 paper on the solution of polynomial equations provides an example of change. The text contains what is sometimes called Lagrange's theorem, but not in the form of a statement about the order of a subgroup dividing the order of a group. After considering whether the results are equivalent, Wardhaugh suggests some questions about change: has an idea become more or less important? Has it become more precise? More general? Is it proved differently at different times? Change is messy and unpredictable, Wardhaugh acknowledges, "but that's what makes the history of mathematics worth studying—more so than if it just consisted of a neat sequence of new discoveries with names and dates attached to them."

How to Read Historical Mathematics ought to convince most students that, done right, the history of mathematics is worth studying. It should give them a sense of the complexity and richness of the task. My students in a history of mathematics course that relies on primary sources read the book over the semester, applying what they learned to the texts we encountered. At the end of the term, I asked for their opinions of the book. One student's response, which he considered to be a criticism, struck me as a sign of Wardhaugh's success in helping my students become historians. "Well," pondered this student, "this really wasn't much different from what I've learned in my regular history courses."

References

Fauvel, J., Gray, J. (Eds.), 1987. The History of Mathematics: A Reader. Palgrave Macmillan, Basingstoke, UK.

Struik, D.J. (Ed.), 1969. A Source Book in Mathematics, 1200–1800. Harvard University Press, Cambridge, MA.

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